I claim

1. A sensor element for an artificial olfactory system, comprising: a sensor substrate; a layer of surface area increasing material on a surface of the substrate; a coating of odorant molecule attachment material on the layer of surface area increasing material; wherein the surface area increasing material is a porous carbon, a material formed of nanotubes, or a material with a micromachined surface.
2. The sensor element of claim 1 wherein the surface area increasing material is a porous carbon.
3. The sensor element of claim 1 wherein the surface area increasing material is a material formed of nanotubes.
4. The sensor element of claim 1 wherein the surface area increasing material is a material with a micromachined surface.
5. The sensor element of claim 1wherein the odorant molecule attachment material is a polymer, a radiation treated material, or a virus attachment material.
6. The sensor element of claim 1wherein the sensor substrate is a resonator.
7. The sensor element of claim 1wherein the sensor substrate is a piezoelectric crystal, a surface acoustic wave (SAW) device, or a micro-machined resonator.
8. The sensor element of claim 1 wherein the odorant molecule attachment material is an antibody, a protein, or a cell membrane.
9. The sensor element of claim 1 further comprising a reactive material operatively associated with the sensor substrate for reacting with a substance to be detected to produce detectable odorant molecules.
10. An artificial olfactory system, comprising a plurality of sensor elements, each comprising a sensor substrate, a layer of surface area increasing material on a surface of the substrate, a coating of odorant molecule attachment material on the layer of surface area increasing material; a measurement device connected

to the plurality of sensor elements to detect changes produced by the presence of odorant molecules; a signal processor connected to the measurement device; wherein the surface area increasing material is a porous carbon, a material formed of nanotubes, or a material with a micromachined surface.

11. The artificial olfactory system of claim 10 wherein the measurement device is a frequency shift detector which detects changes in the resonant frequency of each sensor element.
12. The artificial olfactory system of claim 10 wherein the signal processor is an artificial neural network.
13. The artificial olfactory system of claim 10 wherein the surface area increasing material is a porous carbon.
14. The artificial olfactory system of claim 10 wherein the surface area increasing material is a material formed of nanotubes
15. The artificial olfactory system of claim 10 wherein the surface area increasing material is a material with a micromachined surface.
16. The artificial olfactory system of claim 10 wherein the odorant molecule attachment material is a polymer, a radiation treated material, or a virus attachment material.
17. The artificial olfactory system of claim 10 wherein the odorant molecule attachment material is an antibody, a protein, or a cell membrane.
18. The artificial olfactory system of claim 10 further comprising a reactive material operatively associated with the sensor substrate for reacting with a substance to be detected to produce detectable odorant molecules.